ABSTRACT

A method for automated extraction of surface primitives from seismic data is presented. A preferred embodiment of the method includes defining, typically with sub-sample precision, positions of seismic horizons through an extrema representation of a 3D seismic input volume; deriving coefficients that represent the shape of the seismic waveform in the vicinity of the extrema positions; sorting the extrema positions into groups that have similar waveform shapes by applying classification techniques with the coefficients as input attributes using unsupervised or supervised classification based on an underlying statistical class model; and extracting surface primitives as surface segments that are both spatially continuous along the extrema of the seismic volume and continuous in class index in the classification volume. Three primary applications of the surface primitives are described: combining surface primitives into complete horizon interpretations; defining closed volumes within the seismic volume as the closure of vertically arranged surface primitives; or estimating fault displacement based on the surface primitives. A related computer system and computer program product for implementing the method are also described.